

REMARKS

Claims 16, 20-22, 25-28, 30, 31, 35, 36, and 40-42 are pending. Claims 16, 20, 22, 25, 28, 30, and 35 have been amended and claims 1-15, 17-19, 23, 24, 29, 32-34, 37-39, 43, and 44 have been canceled. In addition, the specification has been amended to correct typographical errors, and Figure 2 of the drawings has been amended to correspond to the specification.

Reconsideration of the application is respectfully requested for the following reasons.

I. The Rejection under 35 USC § 112, First Paragraph/New Matter Rejection.

In the Office Action, claims 16, 19-22, 25-28, 30, 31, 34-36, and 40-42 were rejected on grounds that the specification does not provide a written description of the subject matter recited therein, and on grounds that the specification does not enable that subject matter. A corresponding objection of these claims under 35 USC § 132 was issued to accompany these rejections.

A. Written Description.

The Examiner indicated that the specification does not provide a written description sufficient to support the following recitation in claim 16: “wherein light is transmitted by said corresponding pixel when said voltage is applied by the pair of electrodes and wherein light is not transmitted by said corresponding pixel when said voltage is not applied by the pair of electrodes.” Applicants respectfully submit that one skilled in the art who read the

specification would understand Applicants to be in possession of these features at the time the claimed invention was made.

For example, the specification discloses that when a voltage is not applied to the electrodes above and below the hologram pattern liquid crystal element, incident light is diffracted by a lattice in the liquid crystal element. (See Paragraphs [0073]-[0074]). The diffracted light is shown in Figure 8A.

Paragraphs [0085] - [0087] further indicate how light is transmitted under these circumstances, i.e., when a voltage is not applied. As stated in these paragraphs as presently amended, when a voltage is not applied to electrodes 25 and 27 above and below liquid crystal 26, light traveling through core 22 cannot permeate the liquid crystal. Consequently, although light is transmitted (diffracted) through the lattice pattern in the liquid crystal under these circumstances, see Figure 8A, the light is not transmitted in a way that causes it to appear in resulting image. As a result, the pixel is stated to implement a black picture element. See Paragraph [0087].

The amendment to Paragraph [0085] which clarifies these features does not introduce new matter into the application. Under MPEP § 2163.06, one portion of the application may be amended to conform to subject matter in any other portion of the application as originally filed.

As originally filed, Paragraphs [0085]-[0087] were stated to apply to the case where “a voltage is applied.” See line 1 of Paragraph [0085]. This statement resulted from an error that likely occurred when the priority document (Korean Patent Application No. 2002/56577) was translated into English. In this paper, Paragraph [0085] has been amended to apply to the case where “a voltage is not applied.” (Emphasis added). This amendment conforms Paragraphs [0085]-[0087] to other portions of the specification as originally filed which support this same disclosure.

For example, Paragraphs [0073]-[0076] as originally filed disclose that when a voltage is not applied to the hologram pattern liquid crystal, incident light cannot permeate liquid crystal molecules and therefore is diffracted as shown in Figure 8A. Paragraphs [0085]-[0087] describe this same subject matter, except that a typographical error was made that caused the word “not” to be left out of Paragraph [0085] when translating the priority document into English. Applicants have also submitted with this paper a more precise English translation of the priority document (Korean Patent Application No. 2002/56577) which supports use of the word “not” in the subject matter corresponding to Paragraph [0085]. For these reasons, Applicants respectfully submit that the amendment to Paragraph [0085] introduces no new matter.

Paragraphs [0088]-[0090] describe how light may be transmitted when a voltage is applied to the electrodes above and below the liquid crystal element. However, as originally filed, the word “not” was inadvertently inserted into line 1 of Paragraph [0088].

To correct this typographical error, the word “not” has been deleted from this paragraph. This amendment introduces no new matter, because it merely conforms Paragraphs [0088]-[0089] to other portions of the specification as originally filed. See, for example, Paragraphs [0077]-[0080] which disclose that when a voltage is applied to the electrodes above and below the hologram pattern liquid crystal, incident light permeates the liquid crystal molecules and therefore is transmitted as shown in Figure 8B. Paragraphs [0088]-[0090] describe this same subject matter, except that a typographical error was made that caused the word “not” to be included in line 1 of Paragraph [0088]. The more precise English translation of the priority document (Korean Patent Application No. 2002/56577) submitted with this paper supports Paragraph [0088] as amended herein.

A typographical error of Figure 2 as originally filed was also made. In this figure, the word “OFF” should have been “ON” and the word “ON” should have been “OFF.” This is apparent from the specification as originally filed. See, for example, Paragraphs [0073]-[0080] and Paragraphs [0081]-[0090] as amended herein. These and other portions (e.g., Paragraphs [0095] and [0096]) of the specification indicate that transmitted light occurs when a pixel, or sub-pixel, is considered to be ON and light is diffracted when a pixel, or sub-pixel, is considered to be OFF. A Replacement Sheet for Figure 2 has been submitted with this paper to conform the drawings to the disclosure as originally filed and to the more precise English translation of the priority document.

The aforementioned paragraphs have also been amended to more precisely indicated that the voltage is applied, or not applied, to the first and second electrodes 25 and 27 above and below the hologram pattern liquid crystal. These features are supported, for example, by Paragraph [0056] as originally filed.

In addition to the foregoing amendments, claims 16 and 30 have been amended to recite that “light is transmitted by said corresponding pixel or sub-pixel areas to appear in a displayed image when said voltage is applied by the pair of electrodes and wherein light is transmitted by said corresponding pixel or sub-pixel areas in a direction which causes said light to not appear in the displayed image when said voltage is not applied by the pair of electrodes.” Support for these features may be found, for example, in Figures 8A and 8B, where light is transmitted in a way that causes it not to appear in a displayed image (Figure 8A) when a voltage is not applied and light is transmitted in a way that causes it to appear in a displayed image when the voltage is applied (Figure 8B).

These features are also supported by Paragraphs [0087] and [0090], which have been amended to more precisely indicate that a black picture element (e.g., pixel) is implemented when a voltage is not applied to the electrodes above and below the liquid crystal, and that a white picture element (e.g., pixel) is implemented when a voltage is applied to these electrodes. In the English translation of the specification originally filed, the word “element” was omitted after the word “picture.” The amendments to Paragraphs [0087] and [0090], including the word

“element” after “picture,” are supported by the more accurate translation of the priority document submitted with this paper.

Applicants respectfully submit that the foregoing amendments and remarks are sufficient to overcome the first ground (written description) rejection under 35 USC § 112, first paragraph and the accompanying objection under 35 USC § 132.

B. Enablement.

Applicants respectfully submit that the foregoing amendments and remarks are also sufficient to overcome the second ground (enablement) rejection under 35 USC § 112, first paragraph.

Moreover, the manner in which transmission of light occurs when a voltage is and is not applied to electrodes associated with the liquid crystal element is accomplished, in part, by the differences in refractive indexes between the cladding and core noted by the Examiner. However, these features need not be specifically recited in the claims in order to satisfy the enablement requirement, since in order to satisfy the requirement the specification need only provide a description sufficient to allow one skilled in the art to make and use the invention as claimed. See MPEP § 2164. The specification provides such a sufficient description.

Further, while the *Mayhew* case requires features considered essential to an invention to be recited in the claims, it does not define essential features to be ones that enable a claimed invention. More specifically, whether or not a feature is essential is to be determined under 35 USC § 112, second paragraph, which requires a patent application to draft the claims in such a way as to “particularly point out and distinctly describe what applicant regards as the invention.” The claims satisfy these requirements without reciting the differences in the core and cladding refractive indexes.

In view of the foregoing considerations, withdrawal of the § 112 rejection, first paragraph, rejection is respectfully requested.

II. The Objections to the Claims.

Claims 16, 19-22, 25-28, 30, 31, 34-36, and 40-42 were found to be objectionable. Applicants traverse this rejection for the following reasons.

1) Over. In each instance of its use, the word “over” in claim 16 to describe the relationship between the optical waveguide, the first set of electrodes, the liquid crystal holographic optical element, and the second set of electrodes has clear and definite meaning to one skilled in the art when read in light of the specification and drawings. See, for example, Figures 2 and 3 and corresponding portions of the specification.

2) Number of Times. The phrase “number of times over a predetermined period and frequency, said number of times equal to a gradation level of light to be transmitted by the corresponding pixel” has clear and definite meaning to one skilled in the art when read in light of the specification and drawings. See, for example, pages 16-17 of the specification with reference to Figures 9, 10A and 10B. At this portion of the specification, non-limiting examples of all the terms the Examiner is having trouble understanding are provided.

Because those skilled in the art would readily understand what these terms mean when used in the claims and read in light of the specification, it is respectfully submitted that the claim objection is in error and should be withdrawn.

3) Pixel or Pixel Area. Amendments have been made to ensure that the term “pixel or sub-pixel area” is consistently used throughout the claims.

4) Claims 19 and 34 have been canceled.

III. The § 103(a) Rejection based on the Izumi Patent.

Claims 16 and 23-27 were rejected for being obvious in view of the Izumi patent taken alone. This rejection is traversed for the following reasons.

Claim 16 recites that light is transmitted by a pixel or sub-pixel area to appear in a displayed image when a voltage is applied to the pair of electrodes above and below the holographic pattern liquid crystal element, and that light is transmitted by the pixel or sub-pixel

area in a direction which causes the light to not appear in the displayed image when a voltage is not applied by the pair of electrodes. In addition to these features, claim 16 recites that “the pair of electrodes applies said voltage a number of times over a predetermined period and frequency, said number of times equal to a gradation level of light to be transmitted by the corresponding pixel or sub-pixel area.” These quoted features are not taught or suggested by the Izumi patent.

The Izumi patent discloses two electrodes 23 formed on either side of a liquid crystal layer 24. (See Figure 1). In operation, when the electrodes apply an electric field to the liquid crystal layer, a corresponding pixel emits light. Conversely, when the electrodes do not apply an electric field, the pixel does not emit light. (See column 8, lines 34-68). A diffraction grating disposed between the guide and lower electrode is used to assist in taking light out of the medium. (See column 5, lines 23-26).

However, the Izumi patent does not disclose that its electrodes apply a “voltage a number of times over a predetermined period and frequency, said number of times equal to a gradation level of light to be transmitted by the corresponding pixel.” Absent a disclosure of these features, it is respectfully submitted that the Izumi patent cannot render obvious claim 16 or any of its dependent claims.

In rejecting claim 16, the Examiner acknowledged that the above-quoted features are not taught by the Izumi patent. Notwithstanding this omission, the Examiner concluded that such features would have been well known to one skilled in the art.

Serial No. 10/662,316
Amdt. dated **May 9, 2007**
Reply to Office Action of **January 9, 2007**

Docket No. K-0541

The Examiner, however, did not cite a reference showing that such features are **well known**. Absent such a reference, it can only be concluded that the rejection of claim 16 is based merely on a gratuitous assertion. Such a basis does not satisfy the requirements for establishing a *prima facie* case of obviousness, which requires the examiner to provide objective evidence showing that the features recited in claim 16 are taught or suggested in the prior art. See MPEP § 2142 et seq., *In re Fine*, 5 USPQ.2d 1596 (Fed. Cir. 1988), and *In re Lee*, 61 USPQ.2d 1430 (Fed. Cir. 2002)(**a rejection based on common knowledge and common sense or other so-called well-known prior art does not fulfill the examiner's obligation to cite a reference to support his conclusions**).

For at least the foregoing reasons, the Examiner's rejection of claim 16 based on Izumi is in error as a matter of law and should be withdrawn.

Dependent claim 28 recites that the optical waveguide comprises a plurality of light guiding cores, "each core corresponding to a respective one of the pixel areas disposed in a column or row direction of the display device." These features are also not disclosed by the Izumi patent. Applicants therefore respectfully submit that claim 28 is allowable, not only by virtue of its dependency from claim 16 but also based on the features separately recited therein.

IV. The § 103(a) Rejection based on an Izumi-Rockwell Combination.

Claims 30, 31, and 40-42 were rejected for being obvious in view of an Izumi-Rockwell combination. Claim 30 recites that “the pair of electrodes applies said voltage a number of times over a predetermined period and frequency, said number of times equal to a gradation level of light to be transmitted by the corresponding pixel or sub-pixel area.” As indicated above, the Izumi patent does not teach or suggest these features.

As for Rockwell, this patent was cited for its disclosure of an optical waveguide having a cladding layer. Rockwell does not teach or suggest the features of claim 30 missing from the Izumi patent. Accordingly, it is submitted that the rejection of claim 30 and its dependent claims is in error and should be withdrawn.

V. The §103(a) Rejection based on the Date Patent.

Claims 16 and 19-28 were rejected for being obvious in view of the Date patent.

The Date patent discloses the formation of a liquid crystal layer between electrodes 201 and 203. As shown in Figure 21A, the electrodes are formed adjacent a light guide 204. When a voltage is applied by the electrodes, a holographic element in the liquid crystal layer emits light through a corresponding pixel. And, when no voltage is applied, the holographic element does not emit light. (See column 29, line 57 - column 30, line 5).

However, the Izumi patent does not disclose that its electrodes apply a “voltage a number of times over a predetermined period and frequency, said number of times equal to a gradation level of light to be transmitted by the corresponding pixel.” The Examiner admitted that the Date patent does not teach or suggest these features, but then asserted that such features are well known. Without a reference to support this position, the rejection is in error as a matter of law. Withdrawal of the rejection based on the Date patent is therefore respectfully requested.

Claim 31 recites that an index of refraction of the liquid crystal holographic optical element is substantially the same as an index of refraction of a monomer included with the liquid crystal holographic optical element when said voltage is applied by the pair of electrodes. The Date patent does not disclose these features, i.e., Date discloses the inclusion of a polymer in a liquid crystal layer.

Date, however, does not teach or suggest including a monomer in a liquid crystal layer, and that an index of refraction of the liquid crystal holographic optical element is substantially the same as an index of refraction of a monomer when said voltage is applied by the pair of electrodes. Applicants respectfully submit that these differences further establish the allowability of claim 31 over the Date patent.

Serial No. 10/662,316

Docket No. K-0541

Amdt. dated **May 9, 2007**

Reply to Office Action of **January 9, 2007**

VI. The §103(a) Rejection based on a Date-Rockwell Combination.

The Date patent fails to teach or suggest the same features of claim 30 (noted above) which the Isumi patent fails to teach or suggest. Rockwell also fails to teach or suggest these features. Accordingly, it is submitted that claim 30 and its dependent claims are allowable over an Izumi-Rockwell combination.

In view of the foregoing amendments and remarks, it is respectfully submitted that this application is in condition for allowance. Favorable consideration and timely allowance of the application are respectfully requested.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this, concurrent and future replies, including extension of time fees, to Deposit Account 16-0607 and please credit any excess fees to such deposit account.

Serial No. 10/662,316

Docket No. K-0541

Amdt. dated **May 9, 2007**

Reply to Office Action of **January 9, 2007**

Please note that, given our past experience with this patent examiner, we will mostly likely have to file an appeal in order to seek review of the rejections by the Board of Patent Appeals and Interferences

Respectfully submitted,
KED & ASSOCIATES, LLP



Daniel Y. J. Kim
Registration No. 36,186

Samuel W. Ntiros
Registration No. 39,318

P.O. Box 221200
Chantilly, Virginia 20153-1200
(703) 766-3777 DYK/SWN/kzw

Date: May 9, 2007

Please direct all correspondence to Customer Number 34610